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the *Annales des Sciences Naturelles* for 1880, bears particularly on the histology and embryology of the sea-anemonies and the coral *Balanophyllia*, and should be studied in connection with the brothers Hertwig's nearly contemporaneous work on the histology of the *Actiniæ*, now brought to a close in the *Jena Zeitschrift*.

BASTIAN'S THE BRAIN AS AN ORGAN OF MIND.<sup>1</sup>—One of the author's objects in the preparation of this book was to show that not the brain alone, but the entire nervous system, is the organ of the creature's "mind," and this is shown by reference to the lower animals as well as the vertebrates. He also attacks Ferrier's conclusions as to the localization of the different intellectual powers in the human brain, believing that our knowledge is too imperfect to decide that. But while these are salient points which give tone to the book, the author has presented us with a most useful work upon the nervous systems of animals in general and the correspondence between the structure of the brain of the different classes of vertebrates and their mental powers, which is both novel and useful.

After treating of the nervous system of mollusks, worms and arthropods (crustacea and insects), the author reviews the data derived from a study of the nervous system of invertebrates, and claims that in insects the sense of smell is "marvelously keen," while that of hearing is "developed to a very slight extent." Here we may say that Dr. Bastian has not apparently availed himself of the latest studies on the internal structure of the brain of crustacea and insects by Dietl, Flögel and Krieger, and his own countryman, Mr. E. T. Newton; nor do we think he treats with sufficient detail or comprehensiveness the intellectual powers of insects. He is evidently more at home in the comparative structure of the brain of vertebrates, and here his conclusions and general views appear to us to be well grounded and sound.

As regards the vertebrates, beginning with an account of the brain of fishes and of Amphibia, he goes on to that of the reptiles and birds, and with these as a standard of comparison, pauses to consider the scope of mind in general, of reflex action and unconscious cognition, sensation, ideation and perception, and then discusses consciousness in the lower animals, the nature and origin of instinct, and of nascent reason, emotion, imagination and volition. These subjects will be interesting to those biologists who may be engaged in studying the habits and psychology of animals.

Dr. Bastian regards the whole nervous system as the "organ" of mind, the brain being merely its principal component part. According to his view, instead of supposing that mind and consciousness (in its ordinary acceptation) are co-extensive, mind should include all unconscious nerve actions as well as those

<sup>1</sup> The Brain as an Organ of Mind. By H. Charlton Bastian. With 184 illustrations. New York, 1880. D. Appleton & Co. 12mo., pp. 708.

which are attended by consciousness. These views differ in one or other respect, he claims, from those of Spencer, Lewes and Bain, and still more widely on the other hand from the generality of metaphysicians who habitually regard mind as an entity, and speak of the "mind" using the brain as its instrument.

While the Medusa and organisms only a little above them, such as mollusks and worms, act unconsciously, the intellectual processes being but a few degrees more complex than those which may take place in a sun-dew or other sensitive plant, the author brings forward reasons for the belief that as the nervous system increases in complexity from the lowest animals to the fishes, reptiles and birds, so the mental and motor phenomena of which such organisms are capable, show a similar tendency to increase in complexity. Consciousness first seems to appear, according to the author, in insects, Cephalopods, fishes, reptiles and birds. "These organisms are so high in the scale of organization as to leave no room for doubt that some of their nerve actions are attended by conscious states, but it is impossible for us definitely to decide which are and which are not so endowed."

He ascribes little reason to insects, believing that "while the instincts of birds are perhaps less elaborate, their adaptive intelligence or reason and the strength and definiteness of their emotions are unquestionably far superior to those presented by the social insects." Moreover, the author logically claims that reason, imagination and volition are "mere higher developments arising out of previous processes," such as the automatic actions of the lower animals.

Bastian then describes the brain of mammals, especially *Quadrumana*, and claims that there is a progression in mental capacity from the lower mammals to the monkeys and apes: "The development of intelligence, emotion and volition, which becomes so obvious in lower *Quadrumana*, is, however, recognizable in a still more striking degree when we come to the so-called man-like apes, viz., the gibbons, the chimpanzee, the gorilla, and the orang-outang."

The concluding half of the book is devoted to the human brain and human psychology. The chief interest of the book to us is the fact so well brought out that the leading features of the mind of man have their germs in the mental processes of the lower animals, and that there is, on the whole, a progressive development from invertebrates to man.

Finally the author states his belief that "every higher intellectual and moral process—just as much as every lower sensorial or perceptive process—involves the activity of certain related cell-and-fibre networks in the cerebral cortex, and is absolutely dependent upon the functional activity of such networks." He claims that "consciousness or feeling must be a phenomenon having a natural origin, or else it must be a non-natural, non-

material entity." On the other hand, he is decidedly opposed to the doctrine of automatism held by some extreme evolutionists, closing his book with these words: "But we certainly should not, on this account, allow ourselves to be mentally paralyzed by a belief in the existence of a metaphysical gulf between what is termed the subjective and the objective—the 'Ego' and the 'Non-Ego.' Yet, even some believers in the philosophy of evolution have thus been led to deny the natural origin of conscious states, and have, as a consequence, found themselves forced to hold a doctrine of thoroughgoing 'Automatism'—one in which all notions of free will, duty and moral obligation would seem, from this theoretical basis, to be alike consigned to a common grave, together with the underlying powers of self-education and self-control."

As to the moral nature, Bastian believes that it originated in savage life, after society developed, and says nothing as to the possible existence of the germs in the animals below man.

MASON'S MICROSCOPIC STUDIES ON THE CENTRAL NERVOUS SYSTEM OF REPTILES AND BATRACHIANS.<sup>1</sup>—The author here deals with the form of the spinal cord, and especially that of its enlargement; the nuclei of the nerve cells, and variations in their shape, size, etc., in the same individual: the number of ganglionic bodies in the spinal cord, and their relations to the roots of the spinal nerves, and the difference, if any, which may be determined by sex. After stating the methods of preparation of his sections, Dr. Mason, as a result of very extended examinations of a large number of what we can testify to be beautiful sections of the spinal cord of the frog and different reptiles, concludes as follows:

1. The central canal of the spinal cord of frogs is more nearly cylindrical in shape than has been generally supposed. The oval contour is not seen in cross sections below the second pair of nerves, when the membranes are not removed before hardening.
2. The nuclei of the large nerve-cells are more generally oval in form than are those of the smaller cells.
3. The nerve-cells of the crural enlargement are as abundant as those of the brachial enlargement, if not more so. Their nuclei are larger, as are also the surrounding masses of protoplasm or cell bodies.
4. No difference in structure can be made out in the upper portion of the cord, corresponding with the sexual function in the male. The long-continued and violent tonic spasms of the anterior extremities, must be explained by local hyperæmia influencing the same structure as those which exist in the female.
5. The relation which is generally believed to exist between the

<sup>1</sup> *Microscopic Studies on the Central Nervous System of Reptiles and Batrachians.* The spinal cord of the frog, *Rana pipiens*, *Rana hylecinæ*. By JOHN J. MASON, M. D. (Reprinted from the *Journal of Nervous and Mental Disease*. Jan. 1880.) Chicago, 1880. 8vo, pp. 8.